

ICT USE IN SMES

A Comparison between the North West of England and the Province of Genoa

R. Dyerson, G. Harindranath, D. Barnes

Royal Holloway, University of London, Egham, Surrey, TW20 0EX, U.K.

R. Spinelli

DITEA – Facoltà di Economia, Università degli Studi di Genova, Via Vivaldi 5, I-16126 Genova, Italy

Keywords: Information and communications technology (ICT), Small and medium sized enterprises (SMEs), Adoption, e-Commerce.

Abstract: This paper explores patterns of adoption and use of information and communications technology (ICT) by small and medium sized enterprises (SMEs) in both the North West region of England and the Genoa region of Italy. Here we present the results of this two region survey drawn from two economically significant sectors: high technology manufacturing and food processing. Our main objectives were to explore and compare ICT adoption and use patterns by SMEs in the two regions to identify factors enabling or inhibiting the successful adoption and use of ICT, and to explore the impact of ecommerce on the SMEs. While our main result indicates a generally favourable attitude to ICT amongst the SMEs surveyed, it also suggests a number of differences between the two regions. English SMEs report greater uses of sophisticated ICT applications but Italian SMEs make more use of basic ICT functionality. English SMEs also report more focus on operational matters and often ignore strategic considerations, unlike their Italian counterparts. Having said that, the English SMEs pay less attention to applying ecommerce but appear to make more effective use of the Internet than the Italian SMEs.

1 INTRODUCTION

The most recent report available from e-Business watch (2008) makes the point that small and medium sized enterprises (SMEs) are not deploying information and communications technology (ICT) in the same manner as their larger sized cousins. That is, SMEs view ICT as a way of cutting costs and boosting productivity but are largely ignoring the potential of ICT to enhance strategic opportunities (Ordanini, 2006; Maguire et al., 2007) such as market expansion. This is important not only because SMEs form a significant part of the European business community contributing to value added, employment and tax revenues but also since globalisation is affecting SMEs.

In this paper we present an exploratory survey of two areas; the province of Genoa in Italy and the North West region of England. We focus on two contrasting sectors important to both regions, high technology manufacturing and food processing and

focus our attention on SMEs; defined as a firm with 250 or less employees. Our intention through the survey is to probe the factors important in relation to the use and application of ICT and to compare possible differences in approach between the two regions. Thus, we examine how SMEs in the two regions use ICT and explore whether a common attitude to ICT exists across both countries.

2 REGIONAL PROFILES: ESTABLISHING CONTEXT

In this section we briefly explore the regional profile of the North West of England and the province of Genoa. We find that the two regions share many broad characteristics with both areas undergoing a process of renewal having once been dependent on the wealth brought in from former great trading ports.

2.1 The North West of England

The North West of England comprises of five local authority districts and includes two major UK cities, Manchester and Liverpool. The decline of the traditional heavy industries has brought with it the challenge of industrial regeneration and witnessed a shift towards the service sector. Nonetheless, the North West remains the single biggest contributor to UK manufacturing, some 13% of total turnover in 2005 (ONS, 2008). When gross value added is calculated on a per head basis, the region is ranked seventh out of nine. The region has a collective population of 6.8 million people, of which 2.97 million are employed in 186000 firms (ONS, 2008) covering an economically diverse range of industries (NRDA, 2006). Some 99.5% of firms in the North West have less than 250 employees. (ONS, 2007).

2.2 Genoa

With a different economic structure and dynamic from the Milan and Turin, Genoa has always stood out as the weak ugly duckling of the so-called Italian “industrial triangle” (Caselli, 2003). The gross per head value added generated in the province is € 23067, ahead of the Italian average (€ 21806) but below Turin (€24564) and Milan (€33605) (ISTAT, 2008a), placing Genoa 38th out of 103 Italian provinces. Average firm size is very small – as everywhere in Italy – and only 0.1% of firms have more than 250 employees (Benevolo et al., 2008). With the retreat of the State from the economy and the closure of most public-owned heavy industry, Genoa has been undergoing a process of industrial reorganisation. Indeed, manufacturing accounts for no more than 8.8% in terms of firms and 16.8% in terms of employees. From a total population of around 880000 people, 285000 are employed in 67000 firms; as regards manufacture, 5900 firms employ more than 48000 people (ISTAT, 2008b).

3 ICT AND SMES IN ENGLAND AND ITALY: A BRIEF REVIEW

Here we briefly review the more recent literature as it relates to SMEs use of ICT in the UK and Italy, ignoring more general studies of ICT adoption by SMEs for space reasons.

A feature of ICT research within SMEs in both a British and Italian context is the essentially uniformity of findings. For instance, most studies

find that SMEs use ICT in a reactionary manner in response to customer needs and that they are rarely strategically oriented (see Hicks et al.’s, 2006; Cioppi, et al., 2003; Maguire et al., 2007 for recent examples). Additionally, Harindranath et al.’s (2008) found that in sectors such as food and transport SMEs were also being influenced by compliance requirements to adopt certain types of ICT. Exceptionally, Drew (2003) found that some firms in high-technology sectors linked their use of ICT to business strategies. This may reflect the unique characteristics of high-technology sectors, although, Ordanini (2006) found a growing awareness of the strategic role of ICT by Italian SMEs owner/managers.

Several studies have questioned the validity of various stage adoption models to the SME (Martin et al., 2001; Levy et al., 2003; Zheng et al., 2004), characterising SME owner-managers as essentially cautious. Cioppi et al.’s (2006) results showed a high level of heterogeneity in ICT adoption paths, with some Italian SMEs using a naïve approach while others followed a more structured approach to ICT investments. This may be influenced by the owner manager not having a sufficiently technical background to be able to understand the potential of ICT (Gramignoli et al., 1999; Pavic et al., 2007). Balocco et al. (2006) found that top-management commitment, the presence of a pivotal figure (not necessarily the owner or CEO), and the work of a competent and effective IT department were all important determinants of ICT adoption by Italian SMEs.

That cautious nature is also reflected in Owens et al. (2001) survey of SMEs adoption of ecommerce. They found the Internet being used for communication and “window shop” marketing rather than for on line ordering. Marasini et al.’s (2008) recent study of ecommerce adoption also concluded that SMEs were apt to improvise rather than plan such adoption. There is some, albeit limited, evidence that planning *does* take place but is of a more informal character than in larger organisations (Cragg, 2002). Although, those that are able to implement ecommerce may go on to claim a competitive advantage (Poon, 2000).

The relevance of non financial drivers in ICT adoption is corroborated by other studies. Buonanno et al. (2005) found that “[Italian] SMEs disregard financial constraints as the main cause for ERP system non adoption, suggesting structural and organizational reasons as major ones”. Fontana et al. (2008) found in the adoption of LAN technologies in Italian SMEs that increased operational efficiency,

Table 1: Size of Firms by Sector.

| Country | | | Size of Firm (<i>Number of replies</i>) | | | Total |
|---------|--------|-----------------|---|-----------------|------------------|-------|
| | | | 0-9 employees | 10-49 employees | 50-250 employees | |
| UK | Sector | Manufacturing | 3 | 8 | 14 | 25 |
| | | Food processing | 1 | 5 | 4 | 10 |
| Italy | Sector | Manufacturing | 7 | 18 | 1 | 26 |
| | | Food processing | 5 | 10 | 3 | 18 |

technology-based innovation and growth, and better risk management were the key factors affecting adoption. In contrast, factors such as cost, technological uncertainty and lack of relative advantage seemed to be the most important obstacles to adoption.

In summary, SMEs in both the UK and Italy seem to face similar challenges and opportunities in terms of ICT adoption and use. SMEs in both contexts are constrained in their technological and management capabilities and need external sources of support not merely with the diffusion of new types of ICT but in terms of building internal capabilities to innovate using these technologies. Firms are seen to benefit more when ICT is used strategically than when ICT is tied to mainly operational activities.

4 METHODOLOGY

Genoa and the North West of England were chosen because of their similarities: both are based around old, once thriving, ports in the process of regeneration with similar profiles in terms of business activity. Both look to the SME sector to provide the employment opportunities once offered by much larger businesses. Trying to control as much as possible for the primary regional characteristics would then allow us to explore differences in response between the regions as an outcome of the different business systems, public policy initiatives, history and traditions between Italy and England. We chose high tech manufacturing (SIC 30-33) and food processing as contrasting sectors both of which are economically important to the two regions. The density of SME activity is higher in the Genoa region than in the immediate environment of Liverpool and this dictated the wider survey range for the UK part of

this research. In the North West, regions were selected on a postcode basis and the firms chosen randomly from a generated list derived from the FAME (Financial Analysis Made Easy) database, which provides information on over 3 million companies in the UK). In Genoa, all joint-stock SMEs in the selected industries were considered for the survey, using the AIDA database (the Italian equivalent to FAME) as a source for contact data.

A questionnaire was constructed comprising 26 questions generally requiring discrete responses. It asked for details about the business, the extent of current IT and Internet use (including applications, benefits and problems), IT investment decisions and sources of IT supply and advice. We chose closed ended responses partly to contain differences in language expression but also because the questionnaire was to be administered in slightly different ways in the two regions: telephone interviews in the North West; an online questionnaire via email in Genoa with the respondent filling in the questionnaire themselves. Simple questions requiring categorical type answers were thus used in an attempt to reduce respondent bias. The questionnaire was developed in English and subsequently translated into Italian.

The questionnaire was first applied in the North West region in 2007 as part of a larger national survey (Dyerson *et al.*, 2008) and then applied in Genoa in 2008. The responses were collated and brought together into a single data file with 35 firms for the North West (response rate 7.8%) and 44 firms for Genoa (response rate 41%). These are relatively small sample sizes and so the results must be viewed with this limitation in mind. The higher response rate achieved in Italy may be due to the convenience and flexibility offered by the Internet to respondents compared to the telephone method use in England. It may also be due to better targeting and the more active follow-up of respondents. In the next

section we present some of the data from the surveys, due to space constraints not all results are discussed.

5 SURVEY RESULTS AND DISCUSSION

Here we present and discuss the main results arising from our survey. In doing so, we will highlight similarities and differences between the SMEs in the two regions.

5.1 Firm Profile

Most of the replies received were from firms that have been trading for ten years or more irrespective of sector. The firms from Genoa display a slightly younger profile but this is not significant but a difference exists in terms of firm size. Table 1 indicates that the North West manufacturers were typically larger than their counterparts in Genoa and indeed larger than food processors irrespective of country. The picture is less clear for food processors although on balance the majority of replies suggest a size profile of 50 or less employees.

5.2 Types of ICT used

As we would expect, there is a high reported diffusion of basic ICT such as personal computers, (all almost 100%). Table 2 shows the technologies deployed by our survey firms. Here, Italian firms reported greater diffusion of ICT within basic or more routine business applications; for example a greater proportion of Italian firms use ICT to process orders, record sales, manage stock and documentation than their English counterparts. Notable exceptions in this general finding relate to ERP and market research. Here, English firms reported greater diffusion of such applications than the Italian firms, although, as one might expect, manufacturing firms recorded the highest use of ERP systems irrespective of region. If ICT diffusion in terms of basic functions, is generally more widespread in our Italian firms then specific, arguably more sophisticated, functions such as market research and ERP are used more proportionally by the English firms surveyed.

5.3 ICT Benefits

Our survey firms with one exception all report in high numbers that the greatest single benefit of ICT is in improving productivity. Results are reported in

Table 3. The exception is the Italian food producers who see ICT as primarily important in helping to meet changing regulatory requirements (70% of all Italian food producers in our survey). English food producers also see ICT as helpful in this respect although in not such high proportions (40%). Perhaps this is not surprising given the European Union's emphasis on traceability in food production but the differing proportional response is more difficult to explain. Even more puzzling is the differential response of the manufacturers in our survey with more than twice the number of Italian manufacturers citing this as a benefit compared to the English firms. There is a country divide in two further aspects of reported benefits. Italian firms in proportionately greater number cited faster responses to customers and competitors as benefits. Italian firms also see ICT as helping to improve staff satisfaction in far greater proportions than English firms. Indeed, English manufacturers failed to cite improved staff satisfaction as a benefit. As a general rule though, all the SMEs in our survey generally thought that their ICT represented value for money; English manufacturers were the most pleased (92%) and the Italian food producers the least pleased (76%).

5.4 Factors Influencing ICT Investment

Our survey suggests that both sets of firms are preoccupied by similar pressures to increase sales and reduce their costs. Very few firms wish to maintain the status quo. Within that broad strategic pattern, English manufactures appear to want to expand their number of trading locations and increase collaboration in contrast to Italian manufacturers' intention to increase the number of markets served. Turning to the food processors, Italian firms place greater emphasis on reducing costs and increasing the number of markets served compared to their English counterparts. This may be indicative of a greater sensitivity towards exports than their English counterparts.

The actual benefits reported above broadly correspond to the SMEs stated reasons for investing in ICT. Thus for example all the SMEs place productivity very highly as a motivator for ICT investment. In this sense, the ex ante motivation and the ex post experience of ICT are in alignment for our firms, albeit that our SMEs in general appear to underestimate the ex post benefits. There are

Table 2: Applications by Country.

| | ICT Applications (% of replies within each sector, rounded) | | | | | | | |
|-----------------|---|-----------------|------------------------------|--------|--------|-----------------|-----------------------|---------------------|
| | Order processing | Sales recording | Stock and production control | E.R.P. | Design | Market research | Business intelligence | Document management |
| UK | | | | | | | | |
| Manufacturing | 67 | 79 | 46 | 63 | 42 | 58 | 63 | 54 |
| Food processing | 70 | 70 | 60 | 70 | 50 | 60 | 50 | 70 |
| Italy | | | | | | | | |
| Manufacturing | 96 | 85 | 73 | 19 | 39 | 35 | 62 | 85 |
| Food processing | 77 | 94 | 82 | 12 | 0 | 6 | 35 | 77 |

Table 3: ICT Benefits by Country.

| | ICT Benefits (% of replies within each sector) | | | | | | |
|-----------------|--|--------------------------------------|---------------------------------|-----------------|--------------------------------|-----------------------------|---|
| | Greater productivity/ Reducing costs | Improved product/ service quality | Faster response to customers | Increased sales | Improved staff satisfaction | Kept up with competitors | Kept up with regulatory requirements |
| UK | | | | | | | |
| Manufacturing | 87 | 44 | 44 | 22 | 26 | 13 | 17 |
| Food processing | 80 | 40 | 10 | 20 | 0 | 30 | 40 |
| Italy | | | | | | | |
| Manufacturing | 92 | 65 | 85 | 15 | 42 | 56 | 50 |
| Food processing | 47 | 35 | 65 | 12 | 41 | 41 | 71 |

however some exceptions. Most Italian food processors, 88%, for example cite productivity as a motivator for investment but only 47% report actual benefits of this kind. This suggests that Italian food producers may be struggling to exploit productivity gains from their ICT investment. Similarly, 71% of English manufacturers cite keeping up with competitors as a motivation for investment but only 13% report this as an ex post benefit. On the other hand, 31% and 18% of Italian manufacturers and food producers cite keeping up with competitors as a reason for ICT investment but 58% and 41% of manufacturers and food producers respectively report this as a benefit. This suggests that Italian SMEs are underestimating the effect of ICT

Part of the explanation for this mismatch between expectations and outcomes might lie in the methods used to evaluate their ICT investment. When asked whether they used formal techniques to evaluate their ICT investments there was a striking country effect in the SMEs responses. The English food producers (60%) generally used formal techniques as too did the English manufacturers

although less proportionately (48%). In contrast, both Italian manufacturers and food processors (88% respectively) indicated that they did not use formal techniques to evaluate their investments. At the same time, 45% and 47% of Italian manufacturers and food producers respectively were uncertain over the business benefit of their ICT investment compared to 33% of English manufacturers and 25% of food producers. Of those that indicated using formal techniques, such techniques were typically conducted not in house but by outside consultants, especially with respect to the Italian SMEs (79% and 92% of manufacturers and food producers respectively).

As might be expected, consultants formed the single largest group to whom the SMEs turned for advice. Beyond that though, suppliers appeared popular with the Italian manufacturers and food producers (48% and 53% respectively) whereas the English food producers (40%) preferred to use their own personal networks. English manufacturers by and large appeared to use ICT consultants (56%) with far lower dependence on suppliers (24%) or

personal networks (20%). Perhaps more intriguingly, just one SME in the entire survey acknowledged using Government or the local authority as a source of advice. This pattern is somewhat repeated in determining the factors important in choosing the ICT supplier. Here for all but the English food producers, past experience appeared as important (running from 63-73% compared to 22% of English food producers). English food producers reported personal recommendation (56%) as most important. Finally, Italian SMEs were also influenced by the availability of after sales service by their suppliers (50-60%) compared to the English firms surveyed (17-22%).

5.5 Internet Applications and Impact

An interesting pattern emerges in internet use by our survey firms. As Table 4 shows, the Italian manufacturers reported more extensive use of the internet than any other grouping. These manufacturers display high levels of use in sharing information with customers and suppliers, gathering information and both trading and making payments to their suppliers. English manufacturers in comparison reported very low levels of internet usage. Both sets of food producers reported high internet use to gather information. However although 80% of all the English food SMEs use the internet to share information both with customers and suppliers, this is not carried through into electronic payment. It is also worth pointing out that very few SMEs in our survey use the internet to trade with or receive direct payments from customers – Italian manufacturers making the most use at 38%. Somewhat surprisingly, given this, it is the food SMEs that report highest impact: 20% of English food producers indicated that on line ordering accounted for 5% or less of total sales and another 20% indicated that on line sales accounted for 25% or less; 28% of Italian food producers indicated that on line sales were up to 5% of their total sales. In comparison, just 12% of Italian and 8% of English manufacturers reported that on line sales took up 5% or less of their total sales. It may be that food products are inherently more tradable over the internet than the manufactured products surveyed, although this remains conjecture at present.

Having noted this, the English firms reported proportionately greater success in using the internet to attract sales in addition to existing customers. Both English manufacturers (53%) and food producers (56%) found that the internet attracted

new domestic customers. This was not the case for the Italian SMEs in which just 4% of manufacturers and no food producers attracted additional domestic customers. The pattern is repeated in terms of attracting new international customers in which 27% of English manufacturers and 33% of food producers reported additional sales compared to no Italian manufacturer and just 6% of Italian food SMEs. Thus, although the English manufacturers reported less internet use, those that do, report additional sales both domestically and internationally.

6 CONCLUSIONS

A number of similarities and differences emerge from our survey of the two regions. While SMEs in both regions find that ICT offer benefits to their businesses, much of this benefit remains rooted in operational matters. Given the mainly long established nature of the SMEs in our survey this is disappointing. This is in line with previous studies on an individual country basis but is the first time to our knowledge that the two countries have been explicitly compared.

There are differences in reported behaviour between the two regions although we have to keep in mind the exploratory nature of this survey and the small number of replies. Thus the results have to be treated with caution and remain to be confirmed in a larger study. The North West SMEs generally reported not so high a diffusion of ICT technologies than the Italian SMEs. On the other hand, the Italian SMEs appear to be more orientated towards basic functionality. The indication is that while the Italian SMEs generally does more with basic ICT, the English SMEs are more sophisticated in how they apply ICT. One possible explanation for this is that English SMEs generally possess greater financial and human resources to devote to ICT than their Italian counterparts, although this needs to be explored further. Certainly, the English SMEs in our survey tend to spend more than the Italian SMEs - 50% of all the Italian firms spent less than £25k on ICT in the previous year compared to 32% of all the English firms. The English SMEs also reported greater use of formal techniques to evaluate their ICT investments, perhaps reflecting the larger sums involved. The Italian SMEs also reported cost as a concern more frequently than the English SMEs.

More broadly, while the Italian SMEs reported less sophisticated use of ICT, they were proportiona-

Table 4: Use of Internet by Country.

| | Use of Internet (% of replies within each sector) | | | | | | |
|-----------------|---|-----------|-------------|-----------|----------------|--------------|-----------------------|
| | Share information with: | | Trade with: | | Payments: | | Information gathering |
| | customers | suppliers | customers | suppliers | from customers | to suppliers | |
| UK | | | | | | | |
| Manufacturing | 56 | 44 | 8 | 12 | 12 | 0 | 28 |
| Food processing | 80 | 80 | 20 | 20 | 10 | 10 | 50 |
| Italy | | | | | | | |
| Manufacturing | 69 | 73 | 38 | 77 | 27 | 81 | 77 |
| Food processing | 56 | 50 | 28 | 22 | 39 | 61 | 89 |

tely more proactive in seeking new markets and complying with new regulations. What remains unclear is whether this eagerness towards compliance merely reflects a process of catch up in relation to the English SMEs. In contrast, the English SMEs were more concerned with competition and increasing the number of trading locations. They appear to have more internal expertise and wider personal networks to draw on for help that their Italian counterparts. In contrast, the Italian SMEs appear more reliant on after sales support and express greater concerns over staff attitudes to ICT.

Perhaps as a result, the Italian SMEs are more enthusiastic about internet's potential but achieve less with it than the English SMEs. Thus for example, the English SMEs are much more successful in generating additional custom despite a wariness to adopt on line ordering. For the Italian SMEs, the internet is having the effect of market substitution but in for the English SMEs market extension appears to be happening. So although the Italian SMEs appear to be more entrepreneurial and strategic in outlook, it is the English firms that appear to be achieving practical success. This is an interesting result but we are mindful that this is an exploratory study involving just two regions and two sectors. Further work is required to delve deeper into the SMEs surveyed to tease out organisational and cultural factors. In the future we also plan to extend the analysis into other sectors and other regions to explore the robustness of these findings.

ACKNOWLEDGEMENTS

We gratefully acknowledge the assistance and support of Nammis (<http://www.nammis.co.uk>) in

helping the survey process for the North West of England. We would also like to recognise the financial support received from the Italian National Research Council (CNR).

REFERENCES

- Balocco, R., Mainetti, S. and Rangone, A., 2006. *Innovare e competere con le ICT. Il ruolo delle tecnologie dell'informazione e della comunicazione nella crescita delle PMI*, Il Sole 24 Ore, Milano.
- Benevolo, C. Caselli, L. (Eds.), 2008. *La realtà multiforme delle piccole e medie imprese. il caso della provincia di Genova*, Franco Angeli, Milano.
- Buonanno, G., Faverio, P., Pigni, F., Ravarini, A., Sciuto, D., Tagliavini, M., 2005. Factors Affecting ERP system adoption. A comparative analysis between SMEs and large companies. *Journal of Enterprise Information Management*, 18 (4), 384-426.
- Caselli, L., 2003. Liguria tra sviluppo e emarginazione. In *Ricerche Insieme. Studi in onore di Sergio Vaccà* (p. 129), Franco Angeli, Milano.
- Cioppi, M., Savelli, E., 2006. *ICT e PMI. L'impatto delle nuove tecnologie sulla gestione aziendale delle piccole imprese*, ASPI/INS-Edit, Urbino & Genova.
- Cioppi, M., Savelli, E., Di Marco, I., 2003. Gli effetti delle ICT sulla gestione delle piccole e medie imprese. *Piccola Impresa/Small Business*, (3), 11-50.
- Cragg, P., King, M., Hussin, H., 2002. IT alignment and firm performance in small manufacturing firms. *Journal of Strategic Information Systems*, 11 (2), 109-132.
- Drew, S., 2003. Strategic use of e-commerce by SMEs in the East of England. *European Management Journal*, 21 (1), 79-88.
- Dyerson, R., Harindranath, G. and Barnes, D., 2008, National survey of SMEs' use of IT in four sectors, *Proceedings of the European Conference on Information Management and Evaluation*, Royal

- Holloway-University of London, Egham, United Kingdom.
- EC (European Commission), 2008. *The European e-Business Report 2006/07*, Brussels.
- Fontana, R., Corrocher, N., 2008. Objectives, obstacles and drivers of ICT adoption: What do IT managers perceive? *Information Economics and Policy*, 20, 229-242.
- Gramignoli, S., Ravarini, A., Tagliavini, M., 1999. A Profile for the IT Manager within SMEs. In *Proceedings of the 1999 ACM SIGCPR Conference on Computer Personnel Research* (p. 200), ACM, New York.
- Harindranath, G. Dyerson, R., Barnes, D., 2008, ICT in small firms: Factors affecting the adoption and use of ICT in Southeast England SMEs. In *Proceedings of the 16th European Conference on Information Systems*, Galway, Ireland.
- Hicks, B.J., Culley, S.J., McMahan, C.A., 2006. A study of issues relating to information management across engineering SMEs. *International Journal of Information Management*, 26 (4), 267-289.
- ISTAT, 2008a. *Occupazione e valore aggiunto nelle province*, ISTAT, Roma.
- ISTAT, 2008b. Sistema di indicatori territoriali. [sitis.istat.it]
- Levy, M., Powell, P., Galliers, R., 1999. Assessing information systems strategy development frameworks in SMEs. *Information & Management*, 36 (5), 247-261.
- Maguire, S., Koh, S.C.L., Magrys, A., 2007. The adoption of e-business and knowledge management in SMEs. *Benchmarking: An International Journal*, 14 (1), 37-58.
- Marasini, R., Ions, K., Ahmad, A., 2008. Assessment of e-business adoption in SMEs: A study of manufacturing industry in the UK North East region. *Journal of Manufacturing Technology Management*, 19 (5), 627-644.
- Martin L., Matlay H., 2001. Blanket approaches to promoting ICT in small firms: Some lessons from the DTI ladder adoption model in the UK. *Internet Research: Electronic Networking Applications and Policy*, 11 (5), 399-410.
- Northwest Regional Development Agency, 2006. *Northwest Regional Economic Strategy*. Warrington.
- Office of National Statistics, 2007. *UK Businesses: Activity, Size and Location*, Her Majesty's Stationary Office, London.
- Office of National Statistics, 2008. *Regional Trends 40*, Her Majesty's Stationary Office, London.
- Ordanini, A., 2006. *Information Technology and small business: antecedents and consequences of technology adoption*. Edward Elgar, Cheltenham
- Owens, I., Beynon-Davies, P., 2001. A survey of Electronic Commerce utilization in Small and Medium Sized Enterprises in South Wales. In *Proceedings of The 9th European Conference on Information Systems*, Bled, Slovenia.
- Pavic, S., Koh, S.C.L., Simpson, M., Padmore, J., 2007. Could e-business create a competitive advantage in UK SMEs?. *Benchmarking: An International Journal*, 14 (3), 320-351.
- Poon, S., 2000. Business environment and Internet commerce benefit—a small business perspective. *European Journal of Information Systems*, 9, 72-81
- Zheng, J, Caldwell, N., Harland, C., Powell, P., Woerndl, M., Xu S., 2004. Small firms and e-business: cautiousness, contingency and cost-benefit. *Journal of Purchasing & Supply Management*, 10, 27-39.